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TREATMENT OF EXTREMELY PREMATURE NEWBORN INFANT WITH INO. CLINICAL CASE

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ABSTRACT

Prolonged inhaled nitric oxide (iNO) from birth in preterm neonates with BPD improves endogenous surfactant function as well as lung growth, angiogenesis, and alveologenesis. As a result there is a reduction in the frequency of the "new" form of BPD in neonates under 28 weeks of gestation and birth weight under 1000 gr. Delivery of inhaled nitric oxide is a new method of prevention of chronic lung disease. According to a large number of randomized trials iNO in premature neonates reduces pulmonary morbidity and leads to a reduction of the mortality in this population of patients. This new therapy does not have serious side effects. We represent a clinical case of extremely premature newborn infant with BPD treated with iNO.

KEYWORDS: bronchopulmonary dysplasia, pulmonary hypertension, extremely premature infant, inhaled nitric oxide.

INTRODUCTION:

Inhaled nitric oxide is a pulmonary vasodilator. The drug has been used since 1992 and from 1999 is the drug of choice for treatment of Persistent pulmonary hypertension in newborns /PPHN/[9,10,11,12]. At this moment its usage in premature infants is quite uncertain. In 2006 Ballard et al. published in New England Journal of Medicine that prolonged inhaled nitric oxide (iNO) from birth in preterm neonates with BPD improves endogenous surfactant function as well as lung growth, angiogenesis, and alveologenesis. As a result there is a reduction in the frequency of the "new" form of BPD in neonates under 28 weeks of gestation and birth weight under 1000 gr. Delivery of inhaled nitric oxide is a new method of prevention of chronic lung disease. According to a large number of randomized trials iNO in premature neonates reduces pulmonary morbidity and leads to a reduction of the mortality in this population of patients. This new therapy does not have serious side effects [2,19, 23].

MATERIALS AND METHODS:

We represent a clinical case of extremely premature newborn infant with BPD treated with iNO.

The patient was born from abnormal twin pregnancy, complicated with preeclampsia and preterm, premature rupture of membranes/PPROM/. The mother received corticosteroid prophylaxis before birth. The newborn infant was 25 weeks of gestation, male gender, with birth weight of 500gr. In the delivery room he received full CPR including endotracheal intubation and mechanical ventilation. After stabilization of the condition the baby was admitted to the NICU.

In the NICU the general condition of the baby was poor with hypotension, inconstant systolic murmur. He was on mechanical ventilation/MV/ - SIPPV with high oxygen support, reaching 100%. The infant had clinical and X-ray data for neonatal respiratory distress syndrome /RDS/. /Fig.1/

Surfactant was given twice during the first day but the baby remained with unstable hemodynamics, metabolic acidosis and hypotension. The hypoxic pulmonary failure required MV with high inspiratory pressures and oxygen support. The infant was also treated with high frequency ventilation /HFOV/ for 48 hours.

Two months after birth the baby was still on MV despite two unsuccessful attempts for extubation and giving him nCPAP. The patient had a lot of hypoxic spells, bronchospasms and X-ray data typical for Broncho-pulmonary dysplasia /BPD/. /Fig.2/

We consulted the infant with cardiologist and we did echocardiography, which showed: ASD second type with left to right shunt, no PDA; right ventricular dilatation 10 mm.; persistent high pulmonary pressure in diastole 28-32 mmHg. These results questioned the possible treatment with iNO. The brain ultrasound of the baby showed second grade intraventricular hemorrhage /IVH/.

We started treatment with iNO for 12 days following the scheme: 3 days – 20 ppm, 5 days – 10 ppm, 3 days – 5 ppm, 1 day – 2 ppm. During the whole treatment coagulation status and methemoglobin levels were followed and they stayed at the normal range. During this period we noticed no side effects and no deterioration of the general condition of the child.

RESULTS AND DISCUSSIONS:

His pulmonary function improved, the hypoxic spells disappeared and after 12 days of treatment the infant was extubated with no clinical signs of pulmonary failure and low oxygen needs not exceeding 30%. The control echocardiography showed reduction of the right ventricular diameter – 9 мм; TI 0-1 degree; pulmonary pressure 11 mmHg / before treatment 28-32 mmHg/. The X-ray showed data for milder degree of BPD. /Fig.3/.

One month after the therapy the infant was discharged with weight 2300gr., the brain ultrasound showed no difference. The whole hospital stay of the patient was 120 days, on MV 87 days and 20 days with oxygen support.

The follow up of the baby at four months corrected age showed no delay in neurological development, no retinopathy of prematurity, mild degree of BPD without oxygen needs, no cardiac problems.

CONCLUSION:

Two months after birth the patient was diagnosed to have late pulmonary hypertension /PH/, which is known to be more common with severe BPD (found in 29%). PH is still found in 10% of infants with none, mild or moderate BPD. Late PH is associated with prolong mechanical ventilation and oxygen support, as well as with worse respiratory outcome during infancy. These are the reasons why, it is probably appropriate to screen for PH all infants with BPD near term corrected age, even if they are clinically stable.

Concerning treatment with nitric oxide in premature infants, we can emphasize that it is not recommended in the most critically ill extremely premature babies, because such treatment may be associated with brain injury or even increased mortality. Some trials show reduction of the frequency and severity of BPD, others do not prove such results [18, 22, 24, 25]. The most effective dose, start and duration of treatment, and the selection of infants most likely to benefit remain uncertain [1, 6, 14, 34]. That is why we need more clinical trials for the usage of nitric oxide in premature infants.

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Fig. 1: RDS.

Fig. 2: BPD.

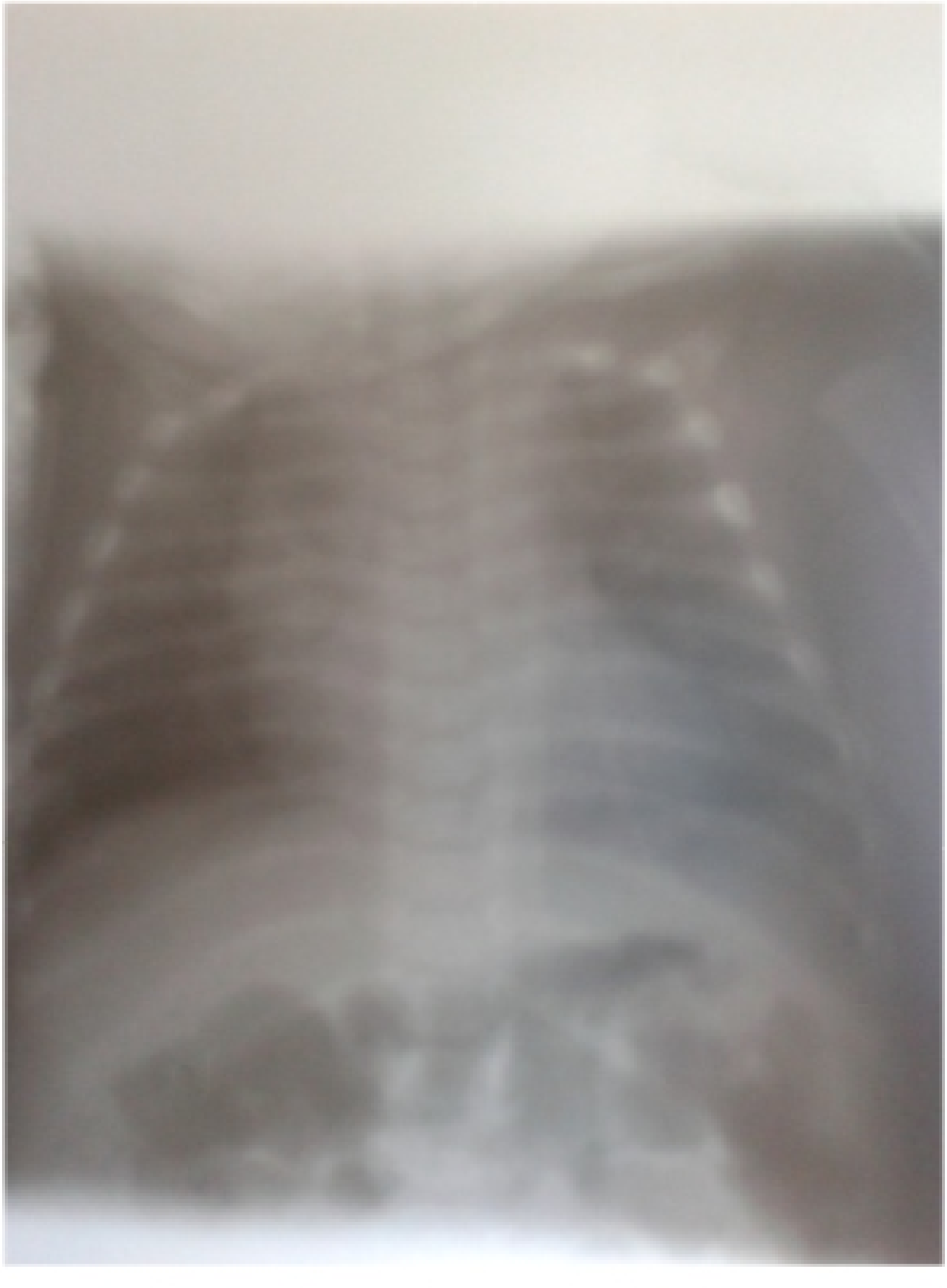

Fig. 3: Milder BPD.